

WHAT IS CLAIMED IS:

1. An apparatus comprising:  
at least a first source of imaging energy;  
at least a second source of imaging energy; and  
5 at least one sensor to measure a signal resulting from the imaging energy  
supplied to tissue by the second imaging energy source.

2. The apparatus of claim 1 wherein the at least a second imaging  
energy source and the at least one sensor are positioned in a manner so that the vicinity of  
an injection site is available for palpation and visible for visual inspection.

3. The apparatus of claim 1 wherein the at least a second imaging  
energy source and the at least one sensor do not contact the skin of a patient.

4. The apparatus of claim 1 wherein the at least a second imaging  
energy source comprises a source of X-ray energy or gamma ray energy.

5. The apparatus of claim 1 wherein the at least a second imaging  
15 energy source comprises a source of ultrasonic energy.

6. The apparatus of claim 1 wherein the at least a second imaging  
energy source and the at least one sensor are connected by a frame member to fix the  
geometry of the at least a second imaging energy source and the at least one sensor about  
the site so that imaging energy from the at least a second imaging energy source passes  
20 through tissue in the vicinity of the site to the at least one sensor.

sub  
A1 7. An apparatus for the detection of extravasation, comprising:  
at least a first energy source to supply X-ray energy or gamma ray energy  
to tissue in the vicinity of a site; and

at least a first sensor to measure a signal resulting from the energy supplied to the tissue by the first energy source.

8. The apparatus of claim 7 wherein the at least a first energy source and the at least a first sensor are connected by a frame member to fix the geometry of the at least a second imaging energy source and the at least a first sensor about the site so the imaging energy from the at least a first energy source passes through tissue in the vicinity of the site to the at least a first sensor.

9. The apparatus of claim 7, further comprising an alarm to indicate the occurrence of extravasation.

10. The apparatus of claim 9 wherein an alarm is indicated if the energy measured at the at least a first sensor falls below a threshold value.

11. An apparatus for the detection of extravasation, comprising:

at least a first energy source to supply ultrasonic energy to tissue in the vicinity of a site; and

at least a first sensor to measure a signal resulting from the energy supplied to the tissue by the first energy source.

12. The apparatus of claim 11, further comprising an alarm system to indicate the occurrence of extravasation.

13. The apparatus of claim 12 wherein the occurrence of extravasation is determined by comparing the energy measured at the at least a first sensor to a threshold value.

14. A method for detecting extravasation in an imaging procedure, comprising:

injecting a contrast medium into a patient;

supplying imaging energy to a region of interest of the patient to create an image;

supplying energy to tissue in the vicinity of a site that is of the same type as the imaging energy; and

5 measuring a signal resulting from the energy supplied to the tissue.

15. The method of Claim 14, further comprising:

measuring a baseline signal before injecting the contrast medium.

16. A method for detecting extravasation in an injection procedure, comprising:

10 supplying at least one of X-ray energy, gamma ray energy or ultrasonic energy to tissue in the vicinity of a site; and

measuring a signal resulting from the energy supplied to the tissue.

17. The method of Claim 16, further comprising:

measuring a baseline signal before beginning the injection procedure.

15 18. An injection system comprising:

a powered injector; and

an extravasation detection apparatus comprising:

at least one source of energy to supply at least one of x-ray energy, gamma ray energy, or ultrasonic energy to tissue in the vicinity of a site; and

20 at least one sensor to measure a signal resulting from the energy supplied to the tissue in the vicinity of the site.

10060561.013002

19. The apparatus of claim 18, further comprising an alarm in communication with the extravasation detection apparatus to indicate occurrence of extravasation.

20. The apparatus of claim 18 wherein the injector and the extravasation detection apparatus are in communicative connection so that an injection procedure is stopped by the injector upon detection of extravasation.

21. The apparatus of claim 19 wherein the alarm indicates extravasation based upon comparing the signal to a threshold value.

22. A method for detecting extravasation in an injection procedure, comprising:

mixing an additive with a contrast medium;

injecting the contrast medium containing the additive;

supplying energy to tissue in the vicinity of a site; and

measuring a signal resulting from the energy supplied to the tissue, the additive being adapted to affect the signal.

23. A method of detecting extravasation of an injection medium, comprising:

supplying energy to tissue in the vicinity of a site, the energy being selected so that the injection medium will reflect, scatter or absorb the energy; and

measuring a signal proportional to the amount of energy reflected, scattered or absorbed.

24. The method of Claim 23, further comprising:

measuring a baseline signal corresponding to a situation in which there is no extravasation.

25. An apparatus for the detection of extravasation, the apparatus comprising:

5 at least a first energy source to supply energy to tissue in the vicinity of a first site;

at least a first sensor to measure a signal resulting from the energy supplied to the tissue by the first energy source;

10 at least a second energy source to supply energy to tissue in the vicinity of a second site; and

at least a second sensor to measure a signal resulting from the energy supplied to the tissue by the second energy source.

26. The apparatus of claim 25 wherein the energy is x-ray energy, gamma ray energy or ultrasonic energy.

10060561.013002

Add  
A2